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LOSS OF DOCTORATES FROM MES (ARMY WATERWAYS EXPERIMENT
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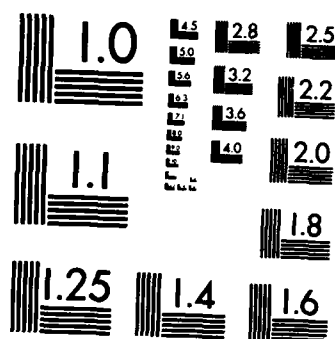
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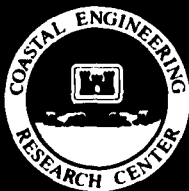
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LOSS OF DOCTORATES FROM WES, 1980-1987

by

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Office of Technical Programs and Plans

DEPARTMENT OF THE ARMY
Waterways Experiment Station, Corps of Engineers
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<p>Consistent with a national interest in the status of doctoral employees in Federal research and development, (R&D) activities, this study was undertaken to compile information on recent losses of employees with doctorates from the US Army Engineer Waterways Experiment Station, (WES). During the period of study, January 1980 through June 1987, the acquisition of doctorates outpaced the loss by 2 to 1. Those who left did so primarily for a higher salary. The private sector attracted 41 percent, universities 22 percent, and other Federal agencies 16 percent. The data indicate that doctoral employees within their first 4 to 5 years of employment at WES are the ones most prone to leaving. Although the loss of doctoral employees has not been excessive, the report offers some considerations on ways that may be effective in their retention. <i>Keynote</i></p>				
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Preface

This report was prepared by Mary K. Vincent of the Office of Technical Programs and Plans (OTP&P), US Army Engineer Waterways Experiment Station (WES) in July 1987 for the Technical Director, WES.

The Commander and Director of WES during the preparation of this report was COL Dwayne G. Lee, CE. Dr. Robert W. Whalin was the Technical Director. Dr. Dennis R. Smith was the Assistant Technical Director and Chief of OTP&P.

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LOSS OF DOCTORATES FROM WES, 1980-1987

Purpose of Study

1. Articles expressing concern over the brain drain from government agencies to the private sector have been appearing frequently in the last 2 years. This, along with a general concern about doctorates in the sciences and engineering fields, has resulted in an interest in the status of doctoral employees in Federal research and development (R&D) activities. Figures reporting the number of employees with doctorates and the percentage of employees with doctorates are apparently more significant now than in the past.

2. This study was undertaken in order to provide the US Army Engineer Waterways Experiment Station (WES) management with information and data about former WES employees who had doctorates; specifically, why did they leave and where did they go? Because the Office of Personnel does not maintain such information, each of the WES laboratories as well as the Instrumentation Services Division and the Engineering and Construction Services Division were asked to provide the data. They were requested to provide, to the extent possible, the following information for any employee with a doctorate who left WES between 1 January 1980 and present (mid-July 1987): name, school that conferred doctorate, date left (month and year), length of time employed at WES (in years and months), area of expertise, reason for leaving, and where they went. The Coastal Engineering Research Center supplied information back to July 1983, the date of its relocation to WES.

Findings

3. Thirty-four doctorates, all from laboratories, left WES between January 1980 and July 1987 (Table 1). Thirty-three had a Ph.D., and one had a doctorate in education. Thirty-two left to take positions elsewhere, one retired after 37 years of service, and one died. This analysis is concerned with the 32 who took other jobs. In addition to the number who left WES, several of the laboratories also noted transfers within WES; nine such instances were reported.

4. A loss of 32 individuals in 7-1/2 years represents a loss rate of between four and five per year. The acquisition of doctorates either through

new hires or by employees completing doctoral degree requirements has averaged about nine per year and outpaced the loss. As shown on Table 2, the number of doctorates at WES has increased nearly 50 percent since 1980.

5. The actual primary motivation for leaving WES is not known for each of the 32 individuals. An anonymous survey would determine the most accurate reasons, but a current address is not known for many. It is assumed that the reasons the laboratories gave are close to what the individuals themselves would state. Table 3 tabulates the reasons the laboratories gave. Several of these reasons overlap. For example, leaving to take a promotion or leaving to go into business may, in some cases, equate with leaving to earn a higher salary. Similarly, taking a teaching position may be somewhat the same as seeking new experience or professional development, or wanting to do "something different." The opportunity to earn a higher salary was clearly the strongest factor for at least one in three and may have been a contributing factor for others.

6. The private sector attracted the greatest number of those who left for other positions: 13 out of 32 (Table 4). Universities and other Federal agencies were next with 7 (22 percent) going to university positions and 5 (16 percent) transferring to other Federal agencies. Three transferred to other Corps offices, each receiving a promotion.

7. The average duration of employment at WES by the 32 who took other jobs was 6.85 years; the range was 1 month to 18 years. Thirteen percent left before completing an entire year at WES (Table 5). The reasons given for departure within a year were: higher salary (2), acceptance of a teaching position (1), and personal, i.e., failure of family to move to Vicksburg (1). The fourth year was the greatest single year for leaving, 19 percent left during their fourth year. Cumulatively, three-fourths of all the departures took place before the tenth year. A secondary peak occurred during the seventeenth and eighteenth years with 12 percent leaving at that time.

8. Table 6 lists the areas of expertise for all 32 individuals. A broad range is reported; some are specific specializations and others are general areas. There was no estimation of how significant the loss of any particular person was or how the loss impacted the overall expertise in that area. Table 7 lists the universities from which they earned their degree.

Supplementary Findings

9. The anonymous survey administered to WES engineers and scientists in April 1986 in conjunction with the expansion of the WES Graduate Institute yields some information useful to this study. The survey was not designed to compile data on career plans, but responses to certain questions indicated relevant perspectives and opinions held by doctoral employees.

10. Fifty-two individuals with doctorates responded to the survey. This is about half of the 118 employed at that time. Their mean age was 41.9 years. The average length of their employment at WES was 11.0 years with a range from 1 to 15 years. Half of the 52 worked in nonsupervisory positions; 15 percent were in top-level management; 8 percent were in mid-level management; and 27 percent were first-line supervisors.

11. In response to the question of where they expected to be in 5 years, 43 of the 52 anticipated that they would still be at WES, 2 could not say, and 7 expected to leave WES for other positions (Table 8). The survey did not ask for a reason as to why they would leave, but it did ask where they expected to go. Of the 7, 2 expect to join the private sector, 2 would go to another Federal agency, 2 would go to a university, and 1 would transfer to another Corps office.

12. Examining a population of 7 cannot lead to any conclusions, but some comparison between these 7 and the 43 who expect to stay may provide some insight (Table 9). Information from the survey indicates that those doctorates who plan to leave WES are generally in nonsupervisory positions and have been at WES less than 5 years. Compared with those who expect to stay, they tend to be less satisfied with their jobs, but are more likely to believe that their current job is preparing them for one with greater responsibility.

Summary and Observations

13. On the average, the number of doctorates departing from WES each year is about half of the number acquired. Since 1980, both the actual number of doctorates and the proportion of the professional staff with doctorates have increased.

14. Each of the various reasons why doctorates have left is indicative of seeking something that WES could not provide. What WES could generally not

provide is a higher salary: nearly a third left for more money. The strongest attractors were the private sector (40 percent), universities (22 percent), and other Federal agencies (16 percent). The data suggest that there are three peak period in which departures are most likely to occur: during the 1st, 4th, and 17th-18th years after beginning employment at WES. Years 4 through 6 are the most critical time: more that a third left during those 3 years.

15. Among those who left within the first 4 years, salary was the predominant reason. After about 5 years, decisions about career changes become more apparent. Of those who left either to go into business or to take positions that would broaden their experience, contribute to their professional development, or to otherwise enable them to "do something different," none left before their 6th year.

16. The greater attention being given to doctorates in Federal R&D activities means that doctorates are becoming an increasingly special commodity. However valid the rationale for this increased interest, the technical and professional value of nondoctoral employees should not be overlooked. Statistics on doctoral degrees can and are being interpreted as an indicator of overall staff quality, but on a case-by-case basis, the possession of a doctoral degree does not denote a base standard of quality in excess of others. Nevertheless, it is in the best interest of WES management to be aware of the loss of doctorates and to consider what can be done to stop this loss. Some comments on this are offered below:

- a. Salary is an important factor in retention, but it is not an option that WES can control. Federal salaries in general are a national concern. A bill (S-1477) has been introduced into Congress that would make Federal hiring and retention of technical personnel more competitive with the private sector.
- b. Doctorates within their first 4 to 5 years of employment at WES appear to be the ones most prone to leaving. Perhaps some have concluded that their experience at WES is not developing into what they expected, in which case there may be nothing that WES management can do to make the job more attractive. However, it may be that this group needs to be given more attention. If WES managers and supervisors are not aware of this phenomenon, they should be; they should also be alert to ways in which working conditions and job challenge can be improved. This is an obvious recommendation, consistent with what any good supervisor strives for for any employee.
- c. One way to give new hires more attention would be through entrance interviews with the Laboratory Chief and the Technical

Director. This would be helpful in establishing a sense of importance and a personal relationship. A follow-on interview 6 to 12 months later could serve to reinforce the positive aspects of the job and bring any negative aspects to the surface. Exit interviews, again with the Laboratory Chief and the Technical Director, would also be beneficial. This recommendation should apply to all senior level employees (grade 14 through SES) with or without doctorates.

- d. Supervisors should give special attention to performance appraisals and individual development or career development plans. This is another obvious recommendation; good supervisors already do this for all their employees.
- e. There is no reason to suspect cutbacks in any of the long-term training programs, but if any are proposed, they should be opposed. These programs are popular and successful. Twenty-one percent of the existing doctorates at WES completed their degree subsequent to long-term training. Employees who do complete a higher degree, whether on their own or subsequent to sponsored training, do deserve some special recognition.

Table 1
Number of Doctorates Lost, By Organization

<u>Year</u>	<u>HL</u>	<u>SL</u>	<u>GL</u>	<u>EL</u>	<u>CERC</u>	<u>ITL</u>	<u>ISD</u>	<u>Total</u>
1980				1	-			1
1981	1	1		5	-			7
1982		2*	1	2	-			5
1983		1	1	1	1			4
1984		1	2		1			4
1985			1	0	1			2
1986				5	1			6
1987 (6 mos)	<u> </u>	<u> </u>	<u> 1 </u>	<u> 2 </u>	<u> 2** </u>	<u> </u>	<u> </u>	<u> 5 </u>
	1	5	6	16	6	0	0	34

Note: HL = Hydraulics Laboratory, SL = Structures Laboratory;
 GL = Geotechnical Laboratory, EL = Environmental Laboratory,
 CERC = Coastal Engineering Research Center, ITL = Information
 Technology Laboratory, ISD = Instrumentation Services Division.

* 1 retired--employed 37 years, graduated from Clarkson College, expertise
 in petrography.

** 1 deceased--employed 8 years, graduated from Texas A&M, expertise in wave
 numerical modeling.

Table 2

Data on Changes in Number of Doctorates, 1980-1987

Year	Estimated Number of Doctorates*	Percent of Engineers and Scientists with Doctorates	Number Hired with Doctorates	Number who Completed Doctorate	Total New Doctorates	Number of Doctorates Left WES	Net Change in Number
1980	79	15.4	6	0	6	1	+5
1981	84	18.3	9	2	11	7	+4
1982	81	16.1	2	2	4	4	0
1983**	99	17.0	15	6	21	4	+17
1984	101	16.7	2	1	3	4	-1
1985	110	16.1	3	5	8	2	+6
1986	118	17.2	7	4	11	6	+5
1987 (6 mos)	117	18.0	1	3	4	4	0
			45	23	68	32	+36

* Sources: Lab of the Year reports, Colonel Creel's Exit Report, Activities Summary reports. Figures from different sources may disagree, but estimates are probably accurate within + four persons.

** Year in which CERC relocated from Fort Belvoir, Virginia, to WES.

Table 3
Reason Given by Laboratories for Why Doctorates Left

<u>Reason</u>	<u>HL</u>	<u>SL</u>	<u>GL</u>	<u>EL</u>	<u>CERC</u>	<u>Total</u>
Open business, join business				4		4
Personal (family)				1	1	2
Promotion		1		2		3
Teach			2		3	5
Higher salary		3	2	4	1	10
Better geographic area				2		2
Experience/professional development/something different	1		2	3		6
Total	1	4	6	16	5	32

Table 4
Positions Doctorates Left To Assume

<u>Position</u>	<u>HL</u>	<u>SL</u>	<u>GL</u>	<u>EL</u>	<u>CERC</u>	<u>Total</u>
Private sector	1	3	1	7	1	13
State agency, Government agency			1	2		3
University*			4		3	7
Other Corps		1		2		3
Other Federal**				4	1	5
Other+				1		1
Total	1	4	6	16	5	32

* University Medical Center (Jackson, Mississippi), Purdue (2), Virginia Institute of Marine Science, Auburn, Virginia Military Institute, University of Southern Mississippi.

** National Oceanic and Atmospheric Administration, US Environmental Protection Agency, US Air Force, US Navy, US Fish and Wildlife Service.

+ United Nations.

Table 5
Timing of Departure from WES for Positions Elsewhere

<u>Time</u>	<u>Number of Departures</u>	<u>Cumulative Number</u>	<u>Percent of Doctoral Departures 1980-1987</u>	<u>Cumulative Percent</u>
Within 1 yr	4	4	13	13
2 yr	1	5	3	16
3 yr	1	6	3	19
4 yr	6	12	19	38
5 yr	2	14	6	44
6 yr	3	17	9	54
7 yr	2	19	6	60
8 yr	2	21	6	66
9 yr	3	24	9	75
10 yr	2	26	6	81
11 yr	1	27	3	84
12 yr	1	28	3	88
17 yr	1	29	3	90
18 yr	3	32	9	100
Total	32			

Average duration of employment at WES = 6.85 yr.

Table 6
Expertise Lost

<u>Expertise</u>	<u>Number</u>
Aquatic biology	1
Biology	1
Botany	1
Chemistry	1
Chemistry, computer science	1
Civil engineering	5
Coastal field measurements, laboratory investigations	1
Coastal geology	2
Concrete technology	1
Ecology	1
Engineering management	1
Environmental engineering	1
Fishery biology	1
Geology	1
Hydrology	1
Limnology	1
Mathematics	1
Pavements/materials	2
Physics	1
Plant physiology	1
Soil science	1
Statistics	1
Structures, weapons effects, earthquake analysis, probability/ statistics	1
Underwater concreting	1
Wave numerical modeling	<u>2</u>
Total	32

Table 7
Where Doctoral Degrees Were Earned

<u>University</u>	<u>Number</u>
Arkansas	1
California, Berkeley	1
Catholic University	1
Cornell	1
Emory	1
Florida State*	1
Illinois	1
Iowa State	1
Kansas	1
Minnesota	1
New York University	1
Oklahoma	2
Oklahoma State	2
Pennsylvania State	1
Purdue	4
Texas A&M	5
Utah State	1
Vanderbilt	1
Virginia	3
Virginia Polytechnic	1
Wyoming	<u>1</u>
	32

* Doctoral degree in math education, not a Ph.D.

Table 8
Expectations for 5 Years From Now

<u>Where Expected to be in 5 Years</u>	<u>Total</u>	
Private sector	2	
University	2	
Other Federal agency	2	
Other Corps office	1	
WES, in existing position	20	} 83% Remain
WES, in different position	23	
Could not answer	<u>2</u>	
Total	52	

Table 9
Summary of Comparison Between Employees with Doctorates
Who Expect to Stay at WES with Those Who Expect to Leave

<u>Basis of Comparison</u>	<u>Expectations for 5 Years from Now</u>	
	<u>Stay at WES</u> <u>(n = 43)</u>	<u>Leave WES</u> <u>(n = 7)</u>
\bar{x} Age	42.2	41.2
\bar{x} Years at WES	12.1	8.4
Percent at WES less than 5 years	24	57
Percent in nonsupervisory positions	43	71
Percent who enjoy job at least most of the time	45	25
Percent who enjoy job half the time or less	28	42
Percent who believe current job is in preparation for a job with more responsibility	29	43

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